

CLAIMS

What is claimed is:

1. A method of providing a firm price quotation for a custom manufactured part, comprising:

- 5 (a) permitting a client to access a server computer system from a client computer over a global communication network;
- (b) uploading from the client computer to the server computer system a computer aided design (CAD) file describing the custom manufactured part;
- 10 (c) analyzing the CAD file on the server computer system to determine one or more manufacturing criteria for the custom manufactured part;
- (d) calculating in the server computer system a firm price quotation for the custom manufactured part based upon the one or more manufacturing criteria; and
- 15 (e) transmitting the price quotation to the client computer over the global communication network.

2. The method of claim 1, wherein:

- 20 step (d) is performed substantially instantly with a pre-programmed pricing formula.

3. The method of claim 2, wherein the pricing formula is in the form:

$$\text{price} = a * V + b * H + c;$$

where a, b and c are preprogrammed constants, where V is the volume of the part, and where H is a vertical dimension of the part in a selected orientation.

4. The method of claim 3, wherein:

the selected orientation of the part is selected to minimize H and thus minimize the calculated price.

5. The method of claim 3, wherein:

the pricing formula includes a finish charge dependent upon a selected finish and a surface area of the part.

6. The method of claim 3, wherein:

the pricing formula includes a multiple part charge dependent upon a quantity of parts quoted.

7. The method of claim 1, further comprising:

prior to step (d), permitting the client to select one of a plurality of available manufacturing processes; and

wherein step (d) includes calculating the price quotation for the selected manufacturing process.

8. The method of claim 7, wherein:

5 the manufacturing process is an additive manufacturing process.

9. The method of claim 8, wherein:

the additive manufacturing process is a stereo lithography process.

10 10. The method of claim 8, wherein:

the additive manufacturing process is a selective laser sintering process.

11. The method of claim 8, wherein:

15 the additive manufacturing process is a fused deposition modeling process.

12. The method of claim 7, wherein:

the manufacturing process is a formative manufacturing process.

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13. The method of claim 12, wherein:

the one or more manufacturing criteria includes volume of the part.

14. The method of claim 7, wherein:

the manufacturing process includes the molding of parts from soft rubber tooling created using a pattern manufactured by an additive manufacturing process; and

5 step (d) is performed with a pre-programmed pricing formula which includes a pattern part pricing formula, a tooling pricing formula, and a molded part pricing formula.

15. The method of claim 7, wherein:

10 the manufacturing process includes injection molding of the parts from thermoplastic material using molds; and

step (d) is performed with a pre-programmed pricing formula which includes a tooling pricing formula and a molded part pricing formula.

15 16. The method of claim 1, wherein:

in step (c), the one or more manufacturing criteria includes volume of the part.

17. The method of claim 16, wherein:

20 in step (c), the one or more manufacturing criteria includes the geometric extent of the part along multiple axes.

18. The method of claim 17, wherein:

in step (c), the one or more manufacturing criteria includes surface area of the part.

5 19. The method of claim 1, wherein:

in step (c), the one or more manufacturing criteria includes the geometric extent of the part along multiple axes.

20. The method of claim 1, wherein:

10 in step (c), the one or more manufacturing criteria includes surface area of the part.

21. The method of claim 1, further comprising:

prior to step (d), selecting one of a plurality of available materials; and
15 wherein step (d) includes calculating the price quotation for the selected material.

22. The method of claim 1, further comprising:

prior to step (d), permitting the client to select one of a plurality of
20 available surface finishes;

wherein in step (c), the one or more manufacturing criteria includes surface area of the part; and

wherein in step (d), the price quotation is dependent upon the selected surface finish and the surface area.

23. The method of claim 1, further comprising:

5 permitting the client to purchase the custom manufactured part online based upon the price quotation.

24. The method of claim 1, further comprising:

10 prior to step (d), permitting the client to select a quantity of the part greater than one; and

wherein step (d) includes calculating the price quotation for the selected quantity, wherein the quantity price per unit is less than the price for a single unit.

15 25. The method of claim 1, being further characterized as a method for providing a firm price quotation for a buildset including a plurality of custom manufactured parts, comprising:

determining a platform area required by each part of the buildset and determining a total platform area required by the buildset;

20 comparing the total platform area required by the buildset to an available platform area of a manufacturing machine to determine whether the entire buildset will fit on the platform;

if the entire buildset will not fit on the platform, dividing the buildset into a plurality of subsets small enough for each subset to fit on the platform;

wherein step (d) further includes calculating a firm price quotation for each subset, and summing the subset price quotations to provide a firm price quotation for the entire buildset.

26. The method of claim 25, wherein the dividing step includes:
ordering the parts from largest to least required platform area; and
selecting the largest parts sequentially to make-up the subsets.

27. The method of claim 1, wherein in step (b) the CAD file is an STL file.

28. The method of claim 1, being further characterized as a method for providing a firm price quotation for a buildset including a plurality of custom manufactured parts, wherein:

step (c) includes:

determining X, Y and Z components for a rectangular box space enclosing each part; and

optimizing an arrangement of the parts of the buildset within an available volume of a selected manufacturing machine to minimize an overall height of the buildset within the manufacturing machine, the

overall height of the buildset being one of the one or more
manufacturing criteria; and

step (d) includes calculating a firm price quotation for the entire
buildset based at least in part upon the overall height of the buildset.

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29. The method of claim 1, wherein the one or more manufacturing criteria
further includes identification of three-dimensional geometric features
relevant to a difficulty of the manufacturing process.

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30. The method of claim 29, wherein the three-dimensional geometric
features include at least one feature selected from the group consisting of
parting lines, undercuts, pockets, protrusions, wall thickness, surface
features and solid features.

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31. A program stored in a computer readable media for generating binding
price quotations for custom manufactured parts comprising:

a CAD file analysis program portion for receiving a CAD file and
analyzing the CAD file to determine one or more manufacturing criteria
corresponding to each custom manufactured part; and

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a price generation program portion for generating a binding price
quotation based upon the one or more manufacturing criteria.

32. The program of claim 31, wherein the CAD files are in STL format.

33. The program of claim 31, wherein:

the price generation program portion includes a pricing formula in the

5 form:

price = a * V + b * H + c;

where a, b and c are preprogrammed constants;

where V is the volume of each part; and

where H is a vertical dimension of each part in a selected orientation.

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34. The program of claim 33, wherein:

the constants a, b and c correspond to a specific business operations

facility and are determined by a statistical regression of multiple data points

of price data for the specific business operations facility onto the pricing

15 formula.

35. The program of claim 33, wherein:

the selected orientation of the part is selected such that H is minimized

and the generated price quotation thus minimized.

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36. The program of claim 33, wherein:

the one or more manufacturing criteria determined by the CAD file analysis program portion include a surface area for each part; and the pricing formula includes a finish charge dependent upon a selected finish and the surface area of the parts.

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37. The program of claim 33, wherein:

the pricing formula includes a multiple part charge dependent upon the quantity of parts quoted.

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38. The program of claim 31, further comprising:

a feature selection program portion for allowing a user of the program to select one or more features for the parts being quoted.

39. The program of claim 38, wherein the one or more features include:

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material;

manufacturing process; and

surface finish.

40. The program of claim 38, wherein:

20 the feature selection program portion allows a user of the program to select one of a plurality of manufacturing processes to be used to manufacture the parts.

41. The program of claim 40, wherein the plurality of manufacturing processes includes:

stereo lithography;

5 selective laser sintering; and

fused deposition modeling.

42. The program of claim 40, wherein the plurality of manufacturing processes include:

10 at least one additive manufacturing process; and

at least one formative manufacturing process.

43. The program of claim 31, wherein the one or more manufacturing criteria include:

15 volume of each part;

geometric extents of each part along multiple axes; and

surface area of each part.

44. The program of claim 43, wherein the one or more manufacturing
20 criteria further includes identification of three-dimensional geometric features relevant to a difficulty of a manufacturing process.

45. The program of claim 44 wherein the three-dimensional geometric features include at least one feature selected from the group consisting of parting lines, undercuts, pockets, protrusion, wall thickness, surface features and solid features.

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46. The program of claim 31, further comprising:

an order generation program portion for assembling all electronic files corresponding to a price quotation into a single directory for transmission to a supplier responsible for the quotation.

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47. The program of claim 31, further comprising:

a buildset grouping program portion for grouping a plurality of parts making up a buildset into a plurality of subsets of parts, each subset being of a size that will fit upon an available platform area of a selected manufacturing machine.

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48. The program of claim 47, wherein:

the price generation program portion calculates a price quotation for each subset, and sums the subset price quotations to generate a binding price quotation for the entire buildset.

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49. The program of claim 47, wherein:

the buildset grouping program portion determines a platform area required by each part, orders the parts from largest to least required platform area, and selects the largest parts sequentially to make-up the subsets.

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50. The program of claim 31, further comprising:

a buildset grouping program portion for grouping a plurality of parts making up the buildset into a plurality of subsets of parts, each subset being of a size that will fit into an available volume of a selected manufacturing machine.

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51. The program of claim 31, further comprising:

a buildset grouping program portion for determining X, Y and Z components for a rectangular box space enclosing each part of a plurality of parts making up a buildset and for then optimizing an arrangement of the parts within the available volume to minimize an overall height of the buildset within the manufacturing machine; and

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wherein the price generation program portion includes overall height of the buildset as one of the one or more manufacturing criteria.

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52. A method of providing a firm price quotation for a custom manufactured part, comprising:

- (a) loading onto a computer system a computer aided design (CAD) file describing the custom manufactured part;
- (b) analyzing the CAD file on the computer system without human intervention to determine one or more manufacturing criteria for the custom manufactured part;
- (c) calculating in the computer system without human intervention a firm price quotation for the custom manufactured part based upon the one or more manufacturing criteria; and
- (d) displaying the price quotation.

53. The method of claim 52, wherein:

step (c) is performed substantially instantly with a pre-programmed pricing formula.

54. The method of claim 53, wherein the pricing formula is in the form:

$$\text{price} = a * V + b * H + c;$$

where a, b and c are preprogrammed constants, where V is the volume of the part, and where H is a vertical dimension of the part in a selected orientation.

54. The method of claim 52, further comprising:

prior to step (c) permitting a user to select one of a plurality of available manufacturing processes; and

wherein step (c) includes calculating the price quotation for the selected manufacturing process.

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56. The method of claim 52, wherein:

in step (b), the one or more manufacturing criteria includes volume of the part.

10 57 The method of claim 52, wherein:

in step (b), the one or more manufacturing criteria includes the geometric extent of the part along multiple axes.

58. The method of claim 52, wherein:

15 in step (b), the one or more manufacturing criteria includes surface area of the part.

59. The method of claim 52, further comprising:

prior to step (c), selecting one of a plurality of available materials; and

20 wherein step (c) includes calculating the price quotation for the selected material.

60. The method of claim 52, further comprising:

prior to step (c), permitting the client to select one of a plurality of available surface finishes;

wherein in step (b), the one or more manufacturing criteria includes
5 surface area of the part; and

wherein in step (c), the price quotation is dependent upon the selected surface finish and the surface area.

61. The method of claim 52, further comprising:

10 prior to step (c), permitting the client to select a quantity of the part greater than one; and

wherein step (c) includes calculating the price quotation for the selected quantity, wherein the quantity price per unit is less than the price for a single unit.

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62. The method of claim 52, being further characterized as a method for providing a firm price quotation for a buildset including a plurality of custom manufactured parts, comprising:

determining a platform area required by each part of the buildset and
20 determining a total platform area required by the buildset;

comparing the total platform area required by the buildset to an available platform area of a manufacturing machine to determine whether the entire buildset will fit on the platform;

if the entire buildset will not fit on the platform, dividing the buildset
 5 into a plurality of subsets small enough for each subset to fit on the platform;

wherein step (c) further includes calculating a firm price quotation for each subset, and summing the subset price quotations to provide a firm price quotation for the entire buildset.

10 63. The method of claim 62, wherein the dividing step includes:
 ordering the parts from largest to least required platform area; and
 selecting the largest parts sequentially to make-up the subsets.

64. The method of claim 52, being further characterized as a method for
 15 providing a firm price quotation for a buildset including a plurality of custom
 manufactured parts, wherein:

step (b) includes:

determining X, Y and Z components for a rectangular box space
 enclosing each part; and

20 optimizing an arrangement of the parts of the buildset within an
 available volume of a selected manufacturing machine to minimize an
 overall height of the buildset within the manufacturing machine, the

overall height of the buildset being one of the one or more
manufacturing criteria; and

step (c) includes calculating a firm price quotation for the entire
buildset based at least in part upon the overall height of the buildset.

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65. The method of claim 52, wherein the one or more manufacturing
criteria further includes identification of three-dimensional geometric
features relevant to a difficulty of the manufacturing process.

10 66. The method of claim 65, wherein the three-dimensional geometric
features include at least one feature selected from the group consisting of
parting lines, undercuts, pockets, protrusions, wall thickness, surface
features and solid features.

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